

MANAGEMENT GUIDELINES FOR COVID-19 CARE and INFECTION PREVENTION & CONTROL IN THE HEALTHCARE SETTING

Generic Africa version, available for use, and country adaptation.



This operational guideline is based on guidelines of WHO, China, the UK and other countries with experience of COVID-19.

It is a guide, but use local knowledge and judgement, recognising that some points may not be relevant or feasible in your setting.

The aim is to manage people ill with possible COVID while continuing other essential care and prevention.

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Introduction to the guideline

It is for managers and health workers in healthcare facilities, and freely available for adaptation and use in any country. There is also a clinical outpatient deskguide being developed. This management and IPC operational guideline is based on guidelines of WHO, China, the UK and other countries with experience of COVID-19. It was developed by a team in China, Toronto Canada and Leeds UK. Please send your comments (and proposed edits in track changes to this document) so we can improve this guideline to xiaolin.wei@utoronto or j.walley@leeds.ac.uk.

Details will change as the epidemic progresses in your country. The aim is to manage people ill with possible COVID while continuing other essential care and prevention.

Key points

The COVID epidemic evolved rapidly from the initial few cases and their contacts, with cases doubling every 3 days and rapid spread within communities. Everyone is susceptible to the infection. Everyone needs education on what to do. Symptoms in at least half of the cases are very mild, especially in children and young adults. As such, they continue their activities and spread the infection, unless social distancing measures – staying at home or keeping 2m apart – are implemented. Patients who are infected but not severely ill can pass on the infection to family and carers, unless they are home isolated for 14 days. Other patients, especially the elderly and/or those with chronic diseases, may get very ill and require oxygen or ventilator support. Within a few weeks of the epidemic there will be a steep climb in cases and deaths. After a few months the numbers stop rising and then start to decline. But after this first peak of cases other epidemics with peaks of cases can follow.

Key manager/ health worker actions: separate, educate, enforce, continue, allocate etc.:

- **Know the risk** Most people recover. All are susceptible to infection, but more than half of (usually younger) people get no or mild symptoms (though can spread it). Overall:
 - 100% are susceptible to getting infected, and must socially distance by 2m, work from home if they can, avoid touching their face, mouth and eyes, and handwash with soap. Based on China and other country data:
 - 98% of people with COVID get better, but need advice and education: Paracetamol, extra fluids etc. and education on how to minimise spreading to others, and a telephone number and directions where to go if more ill:
 - 1 in 5 get very difficult breathing, usually early in the second week of illness.
 - 15 - 20% need hospital care, needing oxygen, some a ventilator and 2% die, ie,
 - Of 100 people infected, 98 recover, half or more have no or mild symptoms, others get more ill. The remaining 15 or 20 get very difficult breathing needing hospitalisation and oxygen, while many of these need ¹ intensive care on

¹ Fei Zhou et al. Clinical Course...inpatients with Covid-19, Wuhan China. *Lancet*, March 2020

ventilators, and 2 die - generally older people and/or with an existing chronic illness.

- **Continue** other services. If we stop thinking/testing for malaria in patients with fever, or regular pneumonia in people with cough and difficult breathing then people will die unnecessarily. If we stop giving vaccinations, TB and other essential care then more people will die from these illnesses. If there is no access to family planning that means more unwanted pregnancies, abortions and maternal deaths. If no diabetes and/or hypertension medicines are provided, then there will be strokes and other such deaths. So provide these essential care and prevention services as before. But routine follow ups eg for hypertension should be made less frequent giving more months prescription/drugs until the next appointment date.
- **Separate** those with symptoms that overlap with those of COVID. Use signs eg: 'Do you have fever, cough or difficult breathing, marking with *arrows* the direction of flow of patients to waiting rooms and consultation rooms and to wards; separating possible COVID from the others:
 - In 'wet' ie 'possible COVID' corridors, rooms and wards, recognising that (until proven by testing) some will be COVID and some not, so strictly enforce 2m distancing, handwashing etc. Treat as possible COVID until otherwise proved, and that testing may take about 4 days. Also look for other possible causes eg if fever do a malaria and urine test, and if cough or shortness of breath count the respiratory rate and listen for crepitations, if present treat as pneumonia with antibiotics, etc.
 - In the 'dry', non COVID corridors, rooms and wards there may be some people who do not (yet) know they are infected - remember, children or recently infected younger adults often get mild illness – so everyone must be 2m apart at all times. Diagnose and treat as usual, using standard treatment guidelines.
- **Educate** staff and patients to keep 2 meters (m) apart at all times in all places outside and inside the waiting rooms, posters on the corridors and wards, 2m (6 feet) marks on the floor, etc. Say, verbally and with signs, that visitors are not allowed, or if essential then limit to one person, always 2m from patients and others, and for a brief time.
- **Enforce** strict hygiene: with soap, with signs to carefully hand wash by patients and by

staff after each patient contact. This is needed in the 'dry' non-COVID areas. In the 'wet' COVID areas all staff should wear gloves AND wash with soap and water (which dissolves the fatty envelop of the virus and kills it). If there's no basin and soap, then provide gel.

- **Allocate** younger health staff to the possible COVID parts of the health facility. Older staff- eg 40 years plus- allocate to the non-COVID 'dry' parts of the facility. Not, however, older staff with a chronic disease (lung, BP, diabetes, heart, blood vessel, kidney etc.). They should do roles strictly not involving contact with others/patients, preferably in a well ventilated space, and strictly social distancing 2m at all times.

Any staff who develop symptoms are to self-isolate at home, in own room, 2m from family/carers, vigilantly hand washing, for 14 days from the start of symptoms. Then when recovered from an obvious COVID they are immune and can work caring for COVID patients.

- **Have clear** how to isolate wet from dry patients, provide good care for COVID and other regular diseases, and, in the IPC section, how to protect our staff - see below.

Chapter 1 Isolation Area Management

1. The Reception and Emergency Room

Separate patients with possible COVID symptoms from those with non-COVID symptoms throughout the entrance, reception, emergency room waiting and consultation rooms.

- Have a designated Desk A and Desk B. Signpost patients to go to Desk A if **no** fever-cough/ difficult breathing and to Desk B if they **do** have any of fever, or cough or difficulty breathing (especially if mention contact with a possible COVID case)
- Instruct the registration staff to ask and confirm the presence of one or more COVID related symptoms
- Direct non-COVID 'dry' patients to Waiting Area A and direct possible COVID patients to Waiting Area B.



A. The normal no-COVID symptom 'dry' patients are triaged and their vital signs are measured. The doctor/clinical officer consults and manages these patients as normal while still observing social distancing and universal precautions. Outpatients are educated on signs of possible COVID and given a telephone number to call (or return) for advice. Inpatients are admitted to non-COVID 'dry' wards, which should be located on a different floor or building of the hospital, separated from COVID ward/areas. However, some patients may not tell the reception staff about COVID symptoms (perhaps due to concern about stigma) but later mention symptoms of possible COVID or are found to have signs (eg fever, rapid pulse, low oxygen saturation or chest signs) – if so manage as possible COVID.

The COVID area is **isolated from the other patients**. Patients are triaged/vital signs taken, are consulted by the doctor/ clinical officer. If severely ill eg very difficult breathing, signs of acute respiratory distress syndrome and/or sepsis (eg **CRB-65 2+ or NEWS** any '3' sign or total score of 5+) urgently transferred to the critical care ward or ²intensive care unit. The intensive care unit itself will be separated into dry and wet area.

² See annexed CRB-65 and NEWS annexed below. See the clinical OPD guide, we will need to review these scores.

2. Designated COVID Isolation Area

2.1 Scope

The designated COVID isolation area is a dedicated and isolated room aiming to provide interim care and monitoring of possible or confirmed COVID patients for a period of 6-24 hrs to determine the need for inpatient admission following assessment of disease severity.

Moderately ill patients with difficult but not severe breathing, and no sepsis are transferred to an observation bed for further monitoring, specifically those meeting criteria:

- Breathless (on walking upstairs but not on the flat or in bed)
- Can speak in sentences
- No signs of being severe/sepsis (e.g. CRB65 '1', or NEWS score 2-4) criteria.

Mildly ill patients without difficulty breathing and no sepsis (CRB65=0 or NEWS 0-1) should be educated on home isolation, appropriate infection prevention and control measures and signs/symptoms requiring urgent return to the hospital. Layout and workflow should meet hospital isolation requirements.

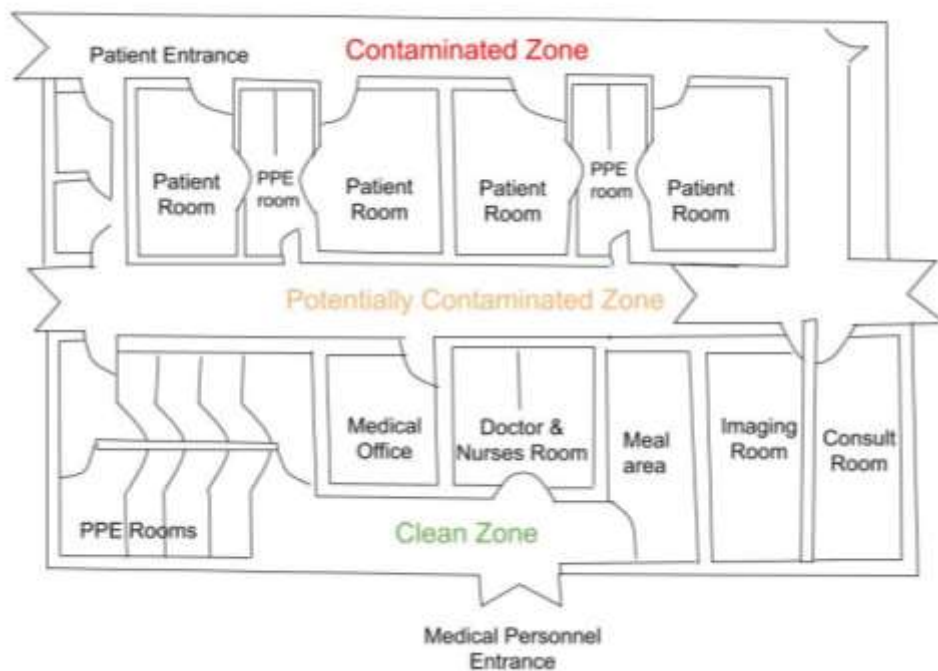
2.2 Layout

(1) Set up an independent tent or room with an exclusive one-way passage at the hospital/emergency department entrance with a visible sign, separating them from the no-fever-cough (clean zone) patients;

(2) Patient movement should follow the principle of three COVID zones:

- A Contaminated Zone
- A Potentially Contaminated Zone
- A Clean Zone

The 3 zones should be clearly signed and demarcated with two buffer zones between the contaminated zone and the potentially contaminated zone;



An example layout of zonings of observation or in-patient rooms. Each hospital needs to lay out zones adapting its existing rooms and corridors³.

- (3) Contaminated items should be stored in an independent passage and a region for one-way delivery of items from an office area to the isolation wards (office to ward all potentially and contaminated, separated from the same for clean);
- (4) Flowcharts of different zones and full-length mirrors should be provided to ensure appropriate PPE procedures with strict observation of movement routes;
- (5) Infection prevention and control (IPC) officers should supervise medical personnel's PPE on and off procedures so as to prevent contamination;
- (6) All non-disinfected items in the contaminated zone should not be removed.

2.3 Designated COVID Isolation Area Requirements

- (1) Possible and confirmed patients should be separated in different isolation areas within the unit, each equipped with separate facilities (e.g. bathroom);
- (2) Confirmed patients can be arranged in the same observation room with bed spacing of

³ Please send to Xiaolin.wei@utoronto or j.walley@leeds.ac.uk comments or examples of your layout.

no less than 1.2 meters (appx 4 feet);

(3) Monitor all patients in the designated COVID isolation area for vital signs and record respiratory rate, oxygen saturation, pulse, blood pressure and temperature;

(4) Signs of clinical deterioration and decompensation should be addressed immediately and decide on follow-up plans should be considered e.g. transfer to inpatient ward;

(5) A doctor/ clinical officer and nurses (1 nurse for every 5 patients) per shift, and with patient rounds at the beginning of each shift (depending on resource availability).

2.4 Patient Selection & Management

(1) Select COVID (possible, likely or confirmed) patients with symptoms e.g. breathing difficulty, but not meeting the requirements either for outpatient care/home isolation or need inpatient admission due to more severe symptoms:

- Increased difficulty breathing
- Can't easily speak in sentences without taking extra breaths
- Can't manage basic things like eating and taking a shower
- Found to have a raised respiratory rate and/or other vital signs (and therefore have a higher CRB65 or NEWS scores)

(2) Exclude patients with an unclear diagnosis or with severe symptoms consistent with requiring an inpatient admission

(3) Ensure that the patient's condition requires a limited amount of service that is consistent to what is available in the designated COVID isolation area

(4) Enforce a strict no visitor policy and confine patient's activity to the isolation ward

(5) Educate patients on use of masks, washing hands etc.

3. Ward Isolation

3.1 Scope of Application

The isolation areas include an observation unit, wards, and an intensive care unit (ICU) area (i.e. separate from non COVID, non-isolation areas). The building layout, staff and workflow should meet the hospital isolation technical regulation/requirements (national or

WHO). Isolation areas should be well ventilated (preferably in negative pressure rooms) and with strictly limited access.

3.2 Layout

Please refer to Section 1.

3.3 Ward Requirements

- (1) Possible and confirmed COVID patients should be separated in different ward areas;
- (2) Possible patients preferably are isolated in single rooms (or at least beds are 2 metres apart) with private facilities e.g. a bathroom
- (3) Confirmed patients can be arranged in the same room with bed spacing of no less than 1.2 meters (appx 4 feet) and with dedicated facilities such as a bathroom.

3.4 Patient Management

- (1) Enforce a strict no visitor policy but allow patients to use their phones to facilitate interactions with loved ones
- (2) Confine patients' activity to the isolation ward
- (3) Educate patients and provide instructions on how to wear surgical masks, proper handwashing, cough hygiene (into mask, tissues or elbow of shirt as available), medical observation and home isolation (quarantine).

Chapter 2 Healthcare Staff Management

1. Workflow Management

- (1) Staff must undergo strict training ideally or on-the-job briefings at the minimum including appropriate PPE for different procedures and pass relevant assessments on the PPE on and off techniques
- (2) The staff should be divided into different teams. Each team should be limited, if possible, to 4 hours work on an isolation ward

(3) Treatment, examination and disinfection for each team should be arranged as a group to reduce the frequency of staff moving in and out of the isolation wards

(4) Before going off duty, staff must wash themselves and conduct necessary personal hygiene regimens to prevent possible infection

2. Staff Health

(1) Frontline staff – healthcare personnel, medical technicians and property & logistics personnel – ideally should live self-isolated away from family members (in isolated accommodation) and avoid social interaction except with similarly exposed colleagues. This is likely not feasible for most contexts/frontline staff. However, staff can reduce the risk of transmitting the virus to their family members e.g changing their clothes at work, taking a shower on arrival at home and keeping 2m from others especially older people or those with chronic diseases, etc.

(2) A nutritious food should be provided. Medical personnel should only eat in designated areas, avoid sharing food and practice social distancing while taking breaks

(3) Monitor and record all staff's health status. Conduct health monitoring for front-line staff, including monitoring body temperature and new respiratory symptoms and address any arising psychological and physiological problems with relevant experts

(4) If the staff have any relevant symptoms such as fever or cough, they should be isolated immediately for 14 days, unless tested and found negative on a CoV PCR test

(5) After completion of work in the isolation area, ideally front-line staff should first be CoV PCR tested, but likely isn't feasible. Even though well, they should continue to minimise risks for 14 days to family members as above (1).

Chapter 3 Hospital Work Plan Requirements

1. Preparation in the Pre/ Early Epidemic Period

1.1 Infection Control Procedures

- Strengthen infection, prevention and control (IPC) of infectious respiratory tract diseases, including wash basin soap/dispensers, hand washing procedure posters, gowns, masks, etc.
- Strengthen the surveillance of pneumonia cases with an unknown aetiology and initiate a tailored emergency backup plan for outbreak prevention and control
- Plan for priority emergency ambulance (as for public health emergencies), with oxygen available, and highest emergency response for severe breathing difficulty (as well as the usual caseloads e.g. chest pain etc.)
- Notify and publish technical specifications at all levels for personnel and logistics
- Constantly update, strengthen and implement original technical specifications.



1.2 Testing

- Regulate collection of throat swab samples
- Submit possible COVID related pneumonia samples
- Favour laboratory tests of possible COVID patients over point of care testing, which are completed in front of patients, in order to reduce healthcare worker exposure.

1.3 Training on Guidance

- Organize training for medical staff on COVID related pneumonia
- Suspend outpatient routine procedures e.g. stop routine endoscopies.
- Post advice for COVID IPC in all wards and outpatient/ emergency departments
- Provide guidance on transfer procedures for mild COVID positive patients
- Provide guidelines on admission for emergency surgery during the epidemic.
- Display rules who can/ not visit inpatients

2. During the Epidemic 'Mitigation' Period

COVID patients are now many, and so:

- Provide guidance on admission procedures and enforce screening for fever, cough and difficulty breathing, and direct patients non/ possible or confirmed COVID outpatient, observation or inpatient admission
- Provide guidance on disease prevention for radiological examinations in fever-cough outpatient (emergency room) clinics and in observation areas
- Adapt non COVID 'clean' outpatient care fully to an appointment-based system
- Standardize the diagnosis and treatment of fever, cough and difficult breathing in hospitalized patients
- Provide guidance for the consultation of staff with fever and respiratory symptoms.

Chapter 4 Infection Prevention and Control (IPC) for COVID

1. COVID Patient IPC Management

1.1 Patient Instructions

- (1) Provide a COVID 'possible' patient with a medical mask and direct patient to an isolation area
- (2) Keep at least 2 m distance between possible patients and other patients
- (3) Instruct all patients to cover nose and mouth during coughing or sneezing with tissue, or at least a flexed elbow, and perform wash hands with soap carefully after contact with respiratory secretions.

1.2 Apply Droplet Precautions

- (1) Use a medical mask if working within 2 m of the patient
- (2) Limit patient movement and ensure patients wear masks when outside their rooms
- (3) Place patients in single rooms, or group and space those with the same possible/ likely or confirmed COVID diagnosis. If a lab test confirmed diagnosis is not possible, group

patients with similar possible or likely clinical symptoms. Patients are considered to be likely if they have a travel or contact history

(4) Use eye protection (face mask or goggles) if in close contact with a patient with respiratory symptoms (e.g. coughing or sneezing).

1.3 Apply Contact Precautions

(1) Use PPE (medical mask, eye protection, gloves and gown) when entering room, remove PPE when leaving and practice hand hygiene following PPE off procedure

(2) If possible, use equipment (e.g. stethoscopes, blood pressure cuffs, pulse oximeters and thermometers) dedicated to that area. Clean and disinfect shared equipment between each patient use

(3) Encourage health care workers to refrain from touching their eyes, nose and mouth with potentially contaminated gloved or ungloved hands as well as environmental surfaces not directly related to patient care (e.g. door handles and light switches)

(4) Avoid medically unnecessary transport of patients.

1.4 Apply Airborne Precautions During an Aerosol-Generating Procedure

(1) Ensure that health care workers performing aerosol-generating procedures (e.g. swab/suction of the nose or throat, intubation, bronchoscopy, cardiopulmonary resuscitation) use the appropriate PPE, including gloves, long-sleeved gowns, eye protection, and fit-tested particulate respirators (N95 / FL3 or equivalent, or higher level of protection)

(2) Check user's mask seal before each use

(3) Use adequately ventilated single rooms or if available negative pressure rooms (with a minimum of 12 air changes per hour or at least 160 L/second/patient in facilities with natural ventilation) when performing aerosol-generating procedures

(4) Avoid unnecessary people in the room

(5) Continue airborne precautions on patients commencing mechanical ventilation.

2. Healthcare Staff IPC Management

1. All staff at the healthcare facilities must wear medical surgical masks
2. All staff working in the emergency department and outpatient departments of infectious diseases, respiratory, gastrointestinal (stomatology, endoscopic) must upgrade from their 'surgical' masks to N95 masks/ Level I protection
3. Staff must wear a protective face screen based on Level II protection while collecting respiratory specimens from possible/confirmed patients.

The Levels of Protection – add protective equipment according to the level of risk:

- Level 1: Work uniform, disposable surgical cap and medical surgical masks
- Level 2: Add disposable medical protective uniform, latex gloves, goggles
- Level 3: Add full-face respiratory protective devices or powdered air-purifying respirator.

Scope of Protective Equipment Application:

- Level 1: wear 'surgical' masks in the reception/ triage area
- Level 2: apply in all clinical areas (but if not sufficient available use level 1)
- Level 3: when doing cough/droplet inducing tests, procedures, autopsies surgery on suspected/ confirmed cases who may spray respiratory fluids or blood.

Always, do not touch your mask or eyes, handwash with soap for 20 seconds, etc.

3. IPC Protocols

1. PPE On and Off Procedures

1.1 Protocol for putting on 'donning' full PPE:

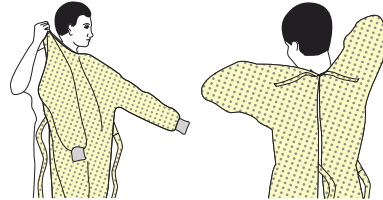
1. Put on special work clothes and work shoes
2. Wash hands
3. Put on disposable surgical cap
4. Put on medical protective mask (N95)
5. Put on inner disposable nitrile/latex gloves
6. Put on goggles and protective clothing (note: if wearing protective clothing without foot covers, please also put on separate waterproof boot covers). Put on a disposable isolation gown (if required in work zone) and face shield (if required in work zone)
7. Put on outer disposable latex gloves.

SEQUENCE FOR **PUTTING ON** PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

1. GOWN

- Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
- Fasten in back of neck and waist



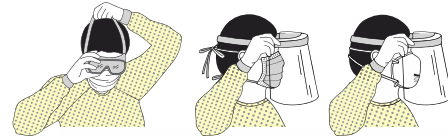
2. MASK OR RESPIRATOR

- Secure ties or elastic bands at middle of head and neck
- Fit flexible band to nose bridge
- Fit snug to face and below chin
- Fit-check respirator



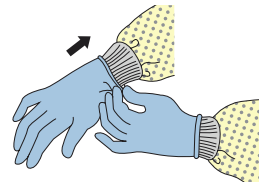
3. GOGGLES OR FACE SHIELD

- Place over face and eyes and adjust to fit



4. GLOVES

- Extend to cover wrist of isolation gown



USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION

- Keep hands away from face
- Limit surfaces touched
- Change gloves when torn or heavily contaminated
- Perform hand hygiene



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1.2 Removing PPE:

HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE) EXAMPLE 2

Here is another way to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator **after** leaving the patient room and closing the door. Remove PPE in the following sequence:

1. GOWN AND GLOVES

- Gown front and sleeves and the outside of gloves are contaminated!
- If your hands get contaminated during gown or glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp the gown in the front and pull away from your body so that the ties break, touching outside of gown only with gloved hands
- While removing the gown, fold or roll the gown inside-out into a bundle
- As you are removing the gown, peel off your gloves at the same time, only touching the inside of the gloves and gown with your bare hands. Place the gown and gloves into an infectious* waste container



2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band and without touching the front of the goggles or face shield
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in an infectious* waste container

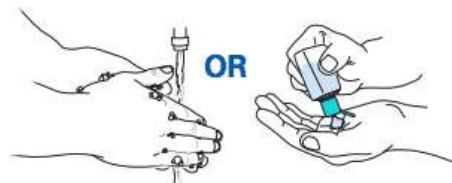


3. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — DO NOT TOUCH!
- If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
- Discard in an infectious* waste container



4. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE



* An infectious waste container is used to dispose of PPE that is potentially contaminated with Ebola virus.

**PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS
BECOME CONTAMINATED AND IMMEDIATELY AFTER
REMOVING ALL PPE**



2. Disinfection Procedures for COVID Isolation Wards/Areas

2.1 Disinfection for Floor and Walls

- (1) Visible pollutants e.g. blood and bodily fluid spills should be completely removed before disinfection and handled in accordance with disposal procedures
- (2) Disinfect the floor and walls with 1000 mg/L chlorine-containing disinfectant through floor mopping, spraying or wiping
- (3) Make sure that disinfection is conducted for at least 30 minutes
- (4) Disinfect three times a day and repeat the procedure whenever there is contamination.

2.2 Disinfection of Object Surfaces

- (1) Visible pollutants should be completely removed before disinfection and handled in accordance with disposal procedures of blood and bodily fluid spills
- (2) Wipe the surfaces of objects with 1000 mg/L chlorine-containing disinfectant or wipes wait for 30 minutes and then rinse with clean water. Perform disinfection procedure three times a day. Repeat at any time when contamination is suspected
- (3) Wipe cleaner regions first, then more contaminated regions: first wipe not frequently touched object surfaces, and then wipe frequently touched object surfaces. (Once an object surface is wiped clean, replace the used wipe with a new one).

2.3 Air Disinfection

- (1) Turn off the fan filter unit (FFU)
- (2) Plasma air sterilizers can be used and continuously run for air disinfection in an environment with human activity
- (3) If there are no plasma air sterilizers, disinfect the air by irradiation by ultraviolet lamps for at least 1 hour each time
- (4) Turn on the FFU to purify the air automatically for at least 2 hours
- (5) Perform this operation three times a day.

2.4 Disposal of Faecal Matter and Sewage

- (1) Before discharge into the municipal drainage system, faecal matter and sewage must

be disinfected by treating with chlorine-containing disinfectant (for the initial treatment, the active chlorine must be more than 40 mg/L) for at least 1.5 hours

(2) The concentration of total residual chlorine in disinfected sewage should be 10 mg/L.

3. Disposal Procedures for Spills of COVID Patient Blood/Fluids

3.1 For Spills of a Small Volume (< 10 mL) of Blood/Bodily Fluids:

(1) Option 1: Cover and carefully remove spills with chlorine-containing disinfecting wipes (containing 5000 mg/L effective chlorine), then wipe object surface twice with chlorine-containing disinfecting wipes (containing 500 mg/L effective chlorine)

(2) Option 2: Carefully remove spills with disposable absorbent materials such as gauze, wipes, etc., which have been soaked in 5000 mg/L chlorine-containing disinfecting solution.

3.2 For spills of a Large Volume (>10 mL) of Blood and Bodily Fluids:

(1) Place signs to indicate the presence of a spill

(2) Perform disposal procedures according to Option 1 or 2:

Option 1: Absorb the spilled fluids for 30 minutes with a clean absorbent towel (containing peroxyacetic acid absorbing up to 1 L of liquid per towel) and then clean the contaminated area after removing the pollutants

Option 2: Completely cover the spill with disinfectant/bleach powder containing water-absorbing ingredients or with disposable water-absorbing materials and then pour a sufficient amount of 10,000 mg/L chlorine-containing disinfectant onto the water-absorbing material (or cover with a dry towel, which will be subjected to high-level disinfection). Leave for at least 30 minutes before removal

(3) Collect patient bodily fluids into special containers and disinfect for 2 hours by a 20,000 mg/L chlorine-containing disinfectant at a spill-to-disinfectant ratio of 1:2

(4) After removing the spills, disinfect the surfaces of the polluted environment or objects.

(5) Soak and disinfect containers holding the contaminants with 5,000 mg/L active chlorine-containing disinfectant for 30 minutes and then clean

(6) The collected pollutants should be disposed of as medical waste.

(7) Place used items into double-layer medical waste bags and dispose as medical waste.

4. Surgical Operations for Possible or Confirmed Patients

4.1 Requirements for Operation Rooms and Staff PPE

- (1) Arrange the patient in a negative pressure operating room. Verify the temperature, humidity and air pressure in the operation room
- (2) Prepare all required items for the operation and use disposable surgical items if possible
- (3) All surgical personnel (including surgeons, anaesthetists, nurses) should put on their PPE in the buffer room before entering the operating room: Put on double caps, medical protective mask (N95), medical goggles, medical protective clothing, boot covers, latex gloves, and powered air-purifying respirator
- (4) The surgeons and the hand-washing nurses should wear disposable sterile operating clothes and sterile gloves in addition to the PPE as mentioned above
- (5) Patients should wear disposable caps and disposable surgical masks according
- (7) The charge nurses in the buffer room are responsible for delivering items from the buffer area to the negative pressure operating room
- (8) During the operation, the buffer room and the operating room should be tightly closed, and the operation must be carried out only if the operation room is under negative pressure
- (9) Irrelevant personnel should be excluded from entering the operating room.

4.2 Procedures for Final Disinfection

- (1) Medical waste should be disposed of as COVID related medical waste
- (2) Reusable medical devices should be disinfected according to the disinfection procedures of COVID related reusable medical devices
- (3) Medical fabrics should be disinfected and disposed of according to the disinfection procedures for COVID related infectious fabrics
- (4) For surfaces of objects (instruments and devices including device table, operating table, operating bed, etc.)

See Section 2.2 Disinfection of Object Surfaces

- (5) For floors and walls:

See Section 2.1 Disinfection for Floors and Walls

(6) For indoor air:

See Section 2.3 Air Disinfection.

5. Disinfection Procedures for Infectious Fabrics of Possible or Confirmed Patients

5.1 Infectious Fabrics

- (1) Clothes, bed sheets, bed covers and pillowcases used by patients
- (2) Ward area bed curtains
- (3) Floor towels used for environmental cleaning.

5.2 Collection Methods

- (1) Pack the fabrics into a disposable water-soluble plastic bag and seal the bag with matching cable ties
- (2) Pack this bag into another plastic bag and seal the bag with cable ties in a gooseneck fashion
- (3) Pack the plastic bag into a yellow fabric bag and seal the bag with cable ties
- (4) Attach a special infection label and the department name
- (5) Send the bag to the laundry room.

5.3 Storage and Washing

- (1) Infectious fabrics should be separated from other infectious fabrics (non-COVID) and washed in a dedicated washing machine
- (2) Wash and disinfect these fabrics with chlorine-containing disinfectant at 90 degrees Celsius for at least 30 minutes.

5.4 Disinfection of Transport Tools

- (1) Use specific special transport tools for transporting infectious fabrics
- (2) Disinfect tools immediately each time after use for transporting infectious fabrics;
- (3) Wipe transport tools with chlorine-containing disinfectant (with 1000 mg/L active chlorine). Leave disinfectant for 30 minutes before wiping the tools with clean water.

6. Disposal Procedures for COVID Related Medical Waste

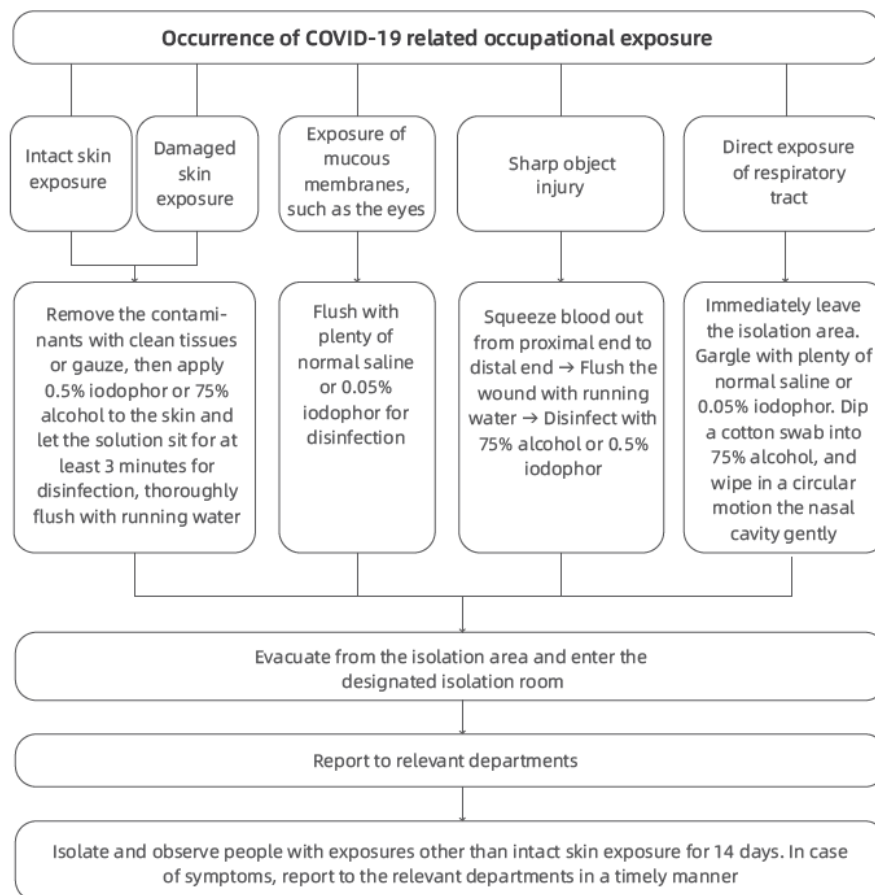
- (1) Dispose all waste generated from possible or confirmed patients as medical waste
- (2) Put the medical waste into a double-layer medical waste bag, seal with cable ties in a gooseneck fashion and spray the bag with 1000 mg/L chlorine- containing disinfectant
- (3) Put sharp objects into a special plastic box, seal and spray it with 1000 mg/L chlorine- containing disinfectant
- (4) Put the bagged waste into a medical waste transfer box, attach a special infection label, fully enclose the box and transfer it
- (5) Transfer the waste to a temporary storage point for medical waste along a specified route at a fixed time point and store the waste separately at a fixed location
- (6) Collect medical waste and dispose using an approved medical waste disposal provider.

7. Procedures for Taking Remedial Actions against Occupational Exposure to COVID

7.1 Examples of Occupational Exposure

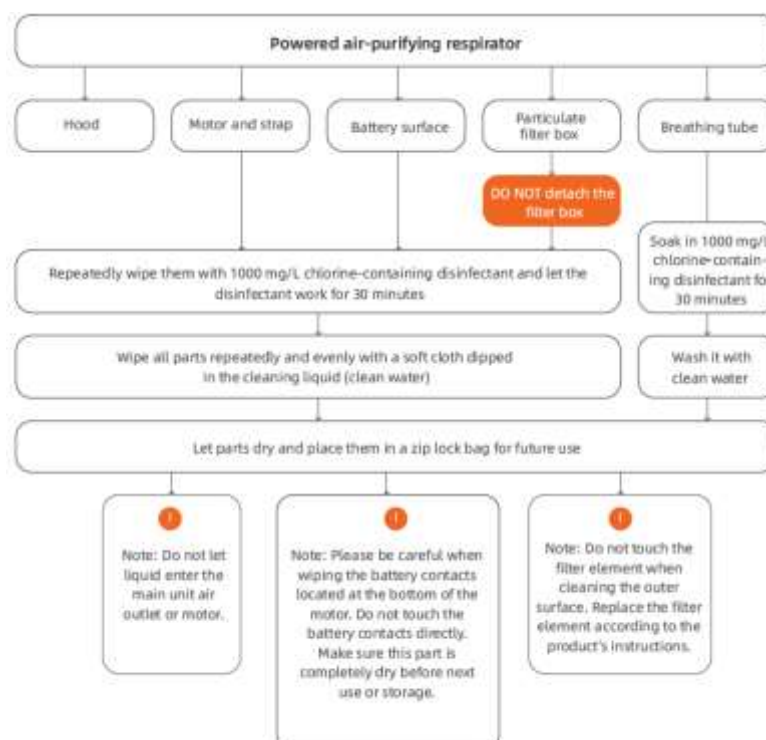
- (1) Skin exposure: The skin is directly contaminated by a large amount of visible bodily fluids, blood, secretions or faecal matter from the patient
- (2) Mucous membrane exposure: Mucous membranes, such as the eyes and respiratory tract are directly contaminated by patient's bodily fluids, blood, secretions or faecal matter
- (3) Sharp object injury: Piercing of the body by sharp objects that were directly exposed to the patient's bodily fluids, blood, secretions or faecal matter
- (4) Direct exposure of respiratory tract: Falling off of a mask, exposing the mouth or nose to a confirmed patient (1 meter away) who is not wearing a mask.

7.2 Exposure in Hospital and Actions Required



8. Disinfection of COVID Related Reusable Medical Devices

8.1 Disinfection of Powered Air-Purifying Respirator *[or as used in your country/setting]*



Note: The disinfection procedures for protective hood described above are only for reusable protective hoods (excluding disposable protective hoods).

8.2 Cleaning & Disinfection Procedures for Endoscopy & Bronchofibroscopy

- (1) Soak the endoscope and reusable valves in 0.23% peroxyacetic acid (confirm the concentration of the disinfectant before use to make sure it will be effective)
- (2) Connect the perfusion line of each endoscope channel, inject 0.23% peroxyacetic acid liquid into the line with a 50-mL syringe until fully filled, and wait for 5 minutes
- (3) Detach the perfusion line and wash each cavity and valve of the endoscope with a disposable special cleaning brush
- (4) Put the valves into an ultrasonic oscillator containing enzyme to oscillate it. Connect the perfusion line of each channel with the endoscope. Inject 0.23% peroxyacetic acid into the line with a 50 mL syringe and flush the line continuously for 5 minutes. Inject air to dry it for 1 minute
- (5) Inject clean water into the line with a 50-mL syringe and flush the line continuously for 3 minutes. Inject air to dry it for 1 minute
- (6) Perform a leakage test on the endoscope
- (7) Put in an automatic endoscopic washing and disinfection machine. Set a high level of disinfection for treatment
- (8) Send devices to the disinfection supply center for sterilization with ethylene oxide.

8.3 Pre-treatment of Other Reusable Medical Devices

- (1) If there are no visible pollutants, soak the device in 1000 mg/L chlorine-containing disinfectant for at least 30 minutes
- (2) If there are any visible pollutants, soak the device in 5000 mg/L chlorine-containing disinfectant for at least 30 minutes
- (3) After drying, pack and fully enclose the devices and send them to the disinfection supply center.

9. Procedures for Handling Bodies of Deceased Possible or Confirmed Patients

- (1) Staff PPE: The staff must make sure they are fully protected by wearing work clothes, disposable surgical caps, disposable gloves and thick rubber gloves with long sleeves, medical disposable protective clothing, medical protective masks (N95) or powered air purifying respirators (PAPRs), protective face shields, work shoes or rubber boots, waterproof boot covers, waterproof aprons or waterproof isolation gowns, etc.
- (2) Dead body care: Fill all openings or wounds the patient may have, such as mouth, nose, ears, anus and tracheotomy openings, by using cotton balls or gauze dipped in 3000-5000 mg/L chlorine-containing disinfectant or 0.5% peroxyacetic acid
- (3) Wrapping: Wrap the body with a double-layer cloth sheet soaked with disinfectant, and pack it into a double-layer, sealed, leak-proof corpse wrapping sheet soaked with chlorine containing disinfectant
- (4) The body should be transferred by the staff in the isolation ward of the hospital via the contaminated area to the special elevator, out of the ward and then directly transported to a specified location for cremation by a special vehicle as soon as possible
- (5) Final disinfection: Perform final disinfection of the ward and the elevator.

Chapter 5: Management of Hospital Supplies

Supply procurement and management is critically important during the COVID pandemic and other healthcare emergencies. The COVID epidemic evolves rapidly from the initial few cases, to doubling every 3 days, to a steep climb in cases and deaths, to peaking in the number of cases to eventual decline. Even in developed countries, hospitals are struggling with diminishing equipment and supplies, and compromises have had to be made. Getting supplies takes time, and needs advance planning and procurement.

1. WHO COVID-19 Critical Items List (30 March 2020)

1.1 Personal Protective Equipment (PPE)

- Gloves (examination, surgical)
- Goggles, protective

- Gown, protective
- Face shield
- Mask, surgical, N95, particulate respirator.

1.2 Diagnostic Equipment

- Lab screening test kit
- Lab confirmation test kit
- RT-PCR kit
- Extraction kit
- Cartridges for RT-PCR automatic systems
- Swab and Viral transport medium.

1.3 Clinical Care Equipment:

- Pulse oximeter
- Concentrator O2, 10L, 230V, 50 Hz + acc.
- Nasal oxygen cannula, with prongs,
- Ventilator patient, for adult, paediatric w/acc.
- CPAP, with tubing and patient interfaces for adult and paediatric, w/acc.
- Suction pump, mechanical
- High-flow nasal cannula (HFNC) w/acc.

2. WHO Disease Commodity Package

Particular priorities are increasing availability and maintaining supplies of:

- Soap and gels for handwashing, at entry, toilets, and at any point of patient contact
- Oxygen, by continuous pressure (CPAP) and when required by ventilators
- Personal protective equipment (PPE).

Click on link to access the **[Disease Commodity Package](#)**

3. WHO COVID-19 Essential Supplies Forecasting Tool

The WHO COVID-19 Essential Supplies Forecasting Tool (ESFT) is to estimate potential requirements for essential supplies during this pandemic of COVID-19. Although it provides users with a case number estimation, this calculator is not an epidemiological calculator.

To forecast essential supplies: it includes estimation of personal protective equipment, diagnostic equipment, biomedical equipment for case management, essential drugs for supportive care, and consumable medical supplies.

The COVID-19 ESFT tool is intended to be complimentary to the Health Workforce tools (Adapt and the Workforce Estimator). Both tools use the same base clinical attack rate ranges and classify health workforce using ILO ISCO codes, but their outputs are intentionally different due to their primary focus.

Click on the link to [access the WHO COVID-19 Essential Supplies Forecasting Tool](#)

4. Maintaining other essential services during COVID

A key point from the introduction includes to continue regular essential services that will be prioritized in their efforts to maintain continuity of service delivery. High-priority categories includes:

- Essential prevention for communicable diseases, particularly vaccination;
- Services related to reproductive health, including family planning and care during pregnancy and childbirth;
- Care of vulnerable populations, such as young infants and older adults;
- Provision of medications and supplies for the ongoing management of chronic diseases, including TB, diabetes/hypertension, epilepsy and mental health conditions;
- Continuity of critical inpatient therapies and surgery eg for appendicitis;
- Accident and emergency care, and common acute presentations that require time-sensitive intervention;
- Other as relevant in your setting.

Access WHO Operational Guide on Maintaining Essential Services by clicking on the link:

<https://www.who.int/publications-detail/covid-19-operational-guidance-for-maintaining-essential-health-services-during-an-outbreak>

Conclusion

We will piloted, revise, and made freely available for adaption and use in any low-middle income country. Please send your comments (and proposed edits in track changes to this document) so we can improve this guideline to xiaolin.wei@utoronto or j.walley@leeds.ac.uk . As well please tell us your experience, innovations and send pictures or figures examples of your health facility layout. These are difficult times, but together we need to tackle the COVID epidemic, while maintaining the essential other

services.

References

1. Liang TB. Handbook of Covid-19 prevention and treatment. Zhejiang: Zhejiang University School of Medicine; 2020. 68 p.
2. National COVID-19 guidelines on eg the Control of Communicable Diseases (CDC) or other public health office, COVID website.
3. World Health Organisation (WHO).
<https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
4. WHO Country and Technical guidance documents, including:
<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance>.

The clinical guide

There is a clinical deskguide to accompany this hospital management and IPC guideline.

Below are the (adapted from UK NICE sepsis) CRB-65 and NEWS tools, referred to above.

Decide if severe/ admit or self-isolation?:

- ⇒ Urgent transfer to hospital if CRB-65 is 3-4 (or NEWS any single 3 or total of 5)
- ⇒ Closely monitor CRB-65 1 (NEWS 1-4) make date/time for a follow up, to reassess
- ⇒ If 0, self-isolation at home, see education below.

CRB-65: Calculate the score

Feature	Measure	Score	<i>Confusion* mental state 1-8: Age, recognition of two persons (e.g. doctor, nurse), DOB, address recall (e.g. 42 West Street), time, date of first or second world war, year, monarch, surgery name, count backwards 20 → 1</i>
Respiratory Rate	>30/minute	1	
Blood Pressure	Systolic < 90 or Diastolic ≤ 60 mmHg	1	
Confusion	Abbreviated mental test* score ≤ 8	1	
65	Or older	1	

Act on the score

Score	Risk of death	Action
0	Low	Manage with local antibiotic protocol

1,2	Intermediate	Closely monitor response, if get worse admit
3,4	High	Call Ambulance/ admit urgently, give antibiotic and oxygen? if available before transfer. Risk of death increases with each hour.

NEWS national early warning score (Child use the danger signs in WHO IMNCI)

If you **have an oximeter**, use the simplified from NICE, Sepsis 'at a glance' aid to clinical judgement on who requires urgent assessment by a hospital/doctor. Rates given for adults (non-pregnant).

NEWS sign and score	0	1	2	3
> more, or < less than	normal	raised	high	severe
Respiratory rate	12 - 20	- (9 – 11)	>20	> 25 < 8
Heart rate	51 - 90	> 90 (40 – 50)	> 110	> 130 < 40
Temperature	36 - 38	> 38 (35 – 36)	> 39	<35
BP Systolic	110 - 220	< 110	< 100	< 90 > 220
Sats (not on oxygen) by oximeter (or cyanosed = 3)	96 -100	< 95	< 93 Or on oxygen	< 91
Level of consciousness	Alert			V, P or U
Urgent assessment hospital? any single 3 or total of 5+ send in				Any

Urgent transfer to hospital/doctor if CRP65 3-4 (or NEWS any single 3 or total of 5) as likely sepsis eg pneumonia/ acute respiratory distress syndrome (ARDS).

III, but not severe, then ask about past illness.

Ask and look for chronic illness: if a co-morbid disease, so more at risk? if:

- i) Any chronic disease of the heart/ blood vessels (CVD), lungs, kidneys etc.
- ii) Frail: elderly, thin, weak, tired, difficult walking or thinking (memory/orientation)

If ill with a chronic disease or frailty => admit as more at risk.

Diagnose and treat CoV *and* other possible diseases do tests *see below*